the Indian Zoology (in t. —.) under the name of *O.* (*Aracana*) *auritus*. On comparison with these species it proved to be very distinct, and therefore I propose for the future to distinguish it as *Ostracion Reevesii*. It is much larger than any of the Australasian species. It is regular, granular, with three smooth rather arched bands on each cheek; in its present dry state it is of a uniform whitish grey colour, and much compressed, and higher than the species above described. The rays of the caudal fin are thick. Besides those named in the list there was also sent an *Apistes*, which appears to be new; it may be called *A. Tasmanensis*, Gray: when dry, lead colour, scaleless, suborbital and preopercular spine very long, produced; middle of dorsal fin with a large black spot; palatine teeth velvet-like.

Brit. Mus. Feb. 10, 1838.

X.—*On the Existence of Spiral Vessels in the Roots of Dicotyledonous Plants.* By the Rev. J. B. Reade, M.A., F.R.S.

To Richard Taylor, Esq.

Peckham, Feb. 10, 1838.

My dear Sir,

In the few explanatory remarks which I ventured to offer in Philosophical Magazine for Nov. 1837, on the chemical composition of vegetable membrane and fibre, I had occasion to allude to the existence of spiral vessels in the roots of dicotyledonous plants. The attention of English botanists being hereby directed to a statement somewhat at variance with received principles, I have been requested to furnish a more detailed account than the nature of my former communication permitted. I must beg, therefore, to avail myself of your valuable pages.

It has been usual to consider spiral vessels as peculiar to the structure of monocotyledonous roots, and as forming a distinctive character between the root and the stem of dicotyledons; and so thoroughly has this opinion of their position gained credit, that I have been able in no case to remove it but by giving ocular demonstration that it is in opposition to facts.

An attempt to trace to their origin the spiral vessels in the

main trunk and leaf-stalks of the carrot led to an examination of the layer of vessels which lie immediately under the bark of the root, and these I found, at first sight, to have every appearance of closely-wound tracheæ. Their brittleness, however, and the frequent anastomosis of the successive coils induced me to suppose that they were annular and not spiral; but, upon maceration, the strong membranous tube to which the fibre was firmly attached suffered speedy decomposition, and the spiral thread was readily unrolled. These tubes taper off at each extremity into conical terminations, and I have seen the contained fluid pass from tube to tube through the oval perforation where they overlap each other. This peculiarity of structure, I am well aware, may be looked upon as imparting to these vessels an intermediate form between elongated cells and true vascular tissue; and hence, perhaps, I ought not to adduce them as examples of the true spiral. I would however notice the curious fact that all the very numerous vessels in this root are of the kind now described. Such is not the case in the root of any other dicotyledon which I have hitherto examined.

In the paper to which I have referred I rested the fact of the occurrence of spiral vessels in the roots of dicotyledonous plants upon the single example of the root of common garden mint. To this I may now add the roots of the radish, dahlia, *Convolvulus minor*, and mustard. The interesting phænomena connected with the development of the root of mustard, as well as the structure of the root itself, will amply repay the most minute attention. If a seed be immersed in water, the testa, in the course of a few hours, will be covered with very minute vessels, starting like radii from its surface. The peculiar refractive power of these vessels renders them a remarkably difficult microscopic object, and I should probably have failed without the assistance of my friend Mr. Bowerbank in arriving at an accurate knowledge of their structure. Their form is entirely novel. A number of wine glasses, with long stems, and inserted into each other, may furnish a somewhat apt illustration of their remarkable appearance; and as the walls of the bell-shaped portion are strengthened by a spiral fibre, the vessels may be described in one word as *fibro-cam-*

panulate. Were I to theorize upon the possible functions of these, the first instruments of the vital principle, I should probably be met by the rebuke, justly merited indeed when but few facts form the basis of confident speculation, "La théorie! la théorie! peut-être que de long-temps encore il nous sera pas permi de nous guider dans ces recherches à la lueur d'un autre flambeau." I pass on, therefore, to describe the structure of the root.

The medullary canal of the stem with its system of vessels is continued without any interruption into the body of the root; or perhaps it would be more accurate to invert the order of these terms, as the root is first developed. The cellular tissue of the young root is studded throughout its entire length with fine fibrils. These I notice for the sake of observing that their length varies under different circumstances of growth. If the seed be well supplied with water these fibrillæ are short, but if the seed be allowed to attach itself to the side of a bottle, for instance, and a few inches from the surface of the water, their length is considerable, and they are constantly beaded, as it were, with small condensed drops of the ascending vapour. It is evident that, in the latter case, the demand for nutriment being greater than the supply, we have a clue to the beautiful contrivance of the elongation of the absorbent vessel. I will here add, though I cannot at present go into the important questions connected with the statement, that the plants which I am now describing were raised in distilled water, and fed by the *vapour of distilled water.*

In addition to these interesting facts connected with the germination of mustard seed, it only remains for me to state that the column of vessels which is found in the body of the root is composed of dotted ducts, derived from the apposition of short cylindrical cells, base to base, annular vessels and spiral vessels. The latter are without doubt "the true vessels which strictly compose the vascular tissue."

Hoping that these few remarks will serve to elucidate this subject,

I am, my dear Sir,

Faithfully yours,

J. B. Reade.